

Original Research Article

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## Study the Effect of Different Levels of Protein and Energy Diet on the Growth, Performance and Economics of Cross Bred (T&D) Piglets Reared in Godda District of Jharkhand, India

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### ABSTRACT

Pig has a great potential to contribute to better economic return to the farmers. A balanced diet having proper ratio of energy and protein need to be prepared to make the pig farming economical. The present study was carried out on over 30 growing three months old crossbred piglets to evaluate the energy and protein requirement in growing and finishing pigs. Accordingly, five diets were prepared viz. T<sub>1</sub> (Medium energy (75%) and medium protein diet (18%); T<sub>2</sub> (Medium energy (75%) and low protein diet (16.20%); T<sub>3</sub> (Low energy (67.50 %) and high protein diet (19.80%); T<sub>4</sub> (Low energy (67.50%) and medium protein diet (18%) and T<sub>5</sub> (Low energy (67.50%) and Low protein diet (16.20%). The average daily body weight gains, feed efficiency in the piglets fed on different experimental groups was calculated. Differences among the groups were observed to be statistically non-significant, yet the rate of gains decreased with decrease of energy and protein levels in their rations notably in the T<sub>5</sub> group. Similarly, cost per kilo gram edible meat was observed to lowest in T<sub>1</sub> (93.68Rs.), followed by T<sub>2</sub> (95.87 Rs.), T<sub>3</sub> (97.91Rs.), T<sub>4</sub> (98.61 Rs.), and T<sub>5</sub> (98.61 Rs.), respectively. The differences in costs incurred on one kg gain in body weight were found to be statistically non- significant.

#### Keywords

Body weight, Feed efficiency, Economics, Energy diet, Protein diet

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### Introduction

Pigs being the most prolific and efficient meat producing animals are very popular among the poor people of the society with tribals of Jharkhand state (Kumar *et al.*, 2008). Pig rearing is one of the most important occupations of rural society especially the tribal masses of India. In India, there is an overall shortage of energy and protein rich feeds and consequently they are costly

(Adesehinwa and Ogunmodede, 1995; Kumar *et al.*, 2008). The choice of including conventional ingredients in swine rations is becoming rather limited. There is a need to explore economic and alternative feed resources available locally at farmer's level. Animal feed, which accounts for 70-80% of the cost of total production, is a big constraint in the rearing of pigs. Good nutritive balanced diet is required for faster growth rate and to obtain the maximum weight. Further, a

balanced diet with ratio of energy and protein need to be prepared to make the pig farming economical. It have been demonstrated that lowering the protein level of feed reduces the energy losses in urine and as heat (Noblet *et al.*, 1987 and Quiniou *et al.*, 1996). The objectives of the current experiment were to determine the effect of various levels of protein and energy based diet at on the growth, performance and economics of cross bred (T&D) piglet reared in Godda district of Jharkhand.

### Materials and Methods

Present experiment was carried out at pig breeding farm of G.V.T. - Krishi Vigyan Kendra, Godda, Jharkhand. Thirty (30) weaned cross breed (T&D) piglets of about three months of age were divided according to their body weight in five groups namely T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub> and T<sub>5</sub>. Each groups consisting of 6 piglets. Piglets of each group were reared separately in separate house. All the piglets were examine for all anti-mortem examination and dewormed before offering the treatment diets (Table 1). The chemical composition of nutrients and vitamin contents of all the ingredients were analyzed. Crude protein and ash % were analyzed by (AOAC, 1995), crude fat (AOAC, 2000), crude fiber and carbohydrate (AOAC, 2012). Statistical analysis of the data was carried out as per the methods of (Snedecor and Cochran 1994).

### Results and Discussion

The average daily body weight gains in the piglets fed on different experimental groups were calculated. Differences among the groups were observed to be statistically non-significant, yet the rate of gains decreased with decrease of energy and protein levels in their rations notably in the 5<sup>th</sup> group. However, the effect of dietary treatment on live weight, food intake, average 858 to 944

gm daily weight gains (ADG) and food conversion FCR were reported by Carpenter *et al.*, (2004) and Noblet *et al.*, (2001) 858 to 944 gm in large white and landrace crossbred with faded dietary protein concentration as 122.5 to 207.5. Compared to the present studies higher daily weight gains were obtained in growing cross-bred piglets by many workers viz. 626 to 691g (Ewan, 1989) who fed rations containing maize cob in the ratio of 1 : 1, 660 to 659 g (Kyriazakis and Emmans, 1992) who added pelleted cassava from 30 to 70 % in the ration of piglets, 561 to 528 g (Hoffman, *et al.*, 1992) who replaced basal feed mixture with 3 to 5 % rape seed meal, 832 to 547 g by (Campbell, and Dunkin; 1983) who replaced maize with deoiled rice bran from 20 to 80 % with ration, 539 to 530 g by (Close, 1994) who studied the effect of keeping pigs in pen/battery on normal concentrate mixture. The growth of piglets in the present study is considered to be satisfactory. Overall, the daily gain recorded in the present studies in a span of 23 weeks was also considered to be satisfactory. The feed efficiency ratio of experimental groups T<sub>1</sub> to T<sub>5</sub> has been calculated to be  $4.17 \pm 0.12:1$ ,  $4.38 \pm 0.16:1$ ,  $4.36 \pm 0.20:1$ ,  $4.42 \pm 0.19:1$  and  $4.37 \pm 0.22:1$  respectively, in the present experiment (Table 4). Differences among the groups were non - significant indicating that all the five rations were equally efficient.

The feed efficiency ratios obtained in the present study were higher when compared to the results of many workers who obtained feed efficiency ratios varying from 4.65 to 7.70 in crossbred pigs when they fed either standard ration or rations containing various levels of different by-products (Morgan, *et al.*, 1975; Nehring and Haenlein, 1973 and Noblet, *et al.*, 1987). However, the feed efficiency ratio obtained in the present studies is in close agreement with those of 3.78 to 4.16 (13) who added 40 to 70 % wheat bran in the rations of middle white Yorkshire piglets.

**Table.1** Different level of energy and protein diet fed to different groups of piglets

Experimental Treatments	groups /	Energy (%)	+	Protein (%)
T <sub>1</sub>		Medium energy (75%)	+	Medium protein (18%)
T <sub>2</sub>		Medium energy (75%)	+	Low protein (16.2%)
T <sub>3</sub>		Low energy (67.5%)	+	High protein (19.8%)
T <sub>4</sub>		Low energy (67.5%)	+	Medium protein (18%)
T <sub>5</sub>		Low energy (67.5%)	+	Low protein (16.2%)

**Table.2** Different ingredients and proportions of concentrate mixture used in different experimental groups

Ingredients	GT <sub>1</sub>	GT <sub>2</sub>	GT <sub>3</sub>	GT <sub>4</sub>	GT <sub>5</sub>
Maize grain (crushed) 10, 80 (Parts /100Kg)	62.00	65.50	18.00	45.00	32.00
Ground nut cake (Decorticated) 40, 75(Parts /100Kg)	20.00	14.50	24.00	20.00	12.00
Wheat brain 12,65(Parts /100Kg)	10.00	12.00	50.00	27.00	48.00
Fish meal 40,60(Parts /100Kg)	6.00	6.00	6.00	6.00	6.00
Mineral mixture (Parts /100Kg)	1.50	1.50	1.50	1.50	1.50
common salt(Parts /100Kg)	0.50	0.50	0.50	0.50	0.50
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
Vitamin supplements (g / 100Kg)	20.00	20.00	20.00	20.00	20.00
CP % (calculated)	17.80	16.19	19.89	17.94	16.16
TDN %	74.7	74.18	68.50	68.40	69.40
DE(Kcal / Kg) (calculated)	3200	3150	3120	3100	3220

**Table.3** Average weekly body weight of the experimental piglets (kg.)

Period (weekly)	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	F	CD
Initial	16.91 ± 0.60	16.91 ± 0.72	16.92 ± 0.56	17.00 ± 0.52	16.83 ± 0.80	1.21	NS*
8 <sup>th</sup>	37.50 ± 2.50	36.08 ± 2.10	35.58 ± 2.12	35.58 ± 2.02	33.58 ± 2.23	0.82	NS*
16 <sup>th</sup>	58.58 ± 4.20	54.50 ± 3.50	53.58 ± 3.6	56.25 ± 3.70	54.92 ± 3.40	1.64	NS*
23 <sup>th</sup>	79.25 ± 7.45	76.33 ± 6.89	76.80 ± 6.78	76.58 ± 5.87	76.67 ± 5.69	1.04	NS*
Total gain in 23 <sup>th</sup> week	62.33 ± 6.28	59.42 ± 5.44	59.88 ± 5.68	59.67 ± 5.22	59.73 ± 5.02	1.24	NS*
<b>AVERAGE GAIN/WEEK</b>	<b>2.72 ± 0.59</b>	<b>2.58 ± 0.46</b>	<b>2.61 ± 0.53</b>	<b>2.62 ± 0.21</b>	<b>2.60 ± 0.56</b>	<b>1.24</b>	NS*
<b>AVERAGE DAILY GAIN (GM)</b>	<b>380.99 ± 31.09</b>	<b>369.07 ± 29.46</b>	<b>371.93 ± 32.61</b>	<b>376.27 ± 45.49</b>	<b>371.68 ± 35.25</b>	<b>1.25</b>	NS*

\*NS =Non –Significance at 5% level.

**Table.4** Average feed efficiency of various rations in cross bred (T D) piglets

Particulars	Experimental groups				
	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>
Feed consumption per pig (kg) during experimental period (168 days on DM basis)	259.66	260.24	261.24	263.98	260.87
Average feed consumption/ pig/day (kg)	1.555	1.558	1.564	1.581	1.562
Total weight gain in 168 days / pigs (kg)	62.33±6.28	59.42±5.44	59.88±5.68	59.67±5.22	59.73±5.02
Weight gain/pig/day (gm)	<b>380.99±31.09</b>	<b>369.07±29.46</b>	<b>371.93±32.61</b>	<b>376.27±45.49</b>	<b>371.68±35.25</b>
Feed gain ratio	<b>4.17±0.12:1</b>	<b>4.38±0.16:1</b>	<b>4.36±0.20:1</b>	<b>4.42±0.19:1</b>	<b>4.37±0.22:1</b>

**Table.5** Economics of production of growing Tamworth and Desi pigs fed various types of rations

Particulars	Group T <sub>1</sub>		Group T <sub>2</sub>		Group T <sub>3</sub>		Group T <sub>4</sub>		Group T <sub>5</sub>	
	Quantity (kg.)	Cost (Rs.)	Quantity (kg.)	Cost (Rs.)	Quantity (kg.)	Cost (Rs.)	Quantity (kg.)	Cost (Rs.)	Quantity (kg.)	Cost (Rs.)
Consumption and cost of concentrate rations / pig	301.93	5839.33	302.61	5696.63	303.77	5862.76	306.95	5884.23	303.33	5532.74
Cost of feeding/ animal / day		34.76		33.91		34.90		35.03		32.93
Weight gain/ piglet / day (gm.)	<b>380.99±31.09</b>		<b>369.07±29.46</b>		<b>371.93±32.61</b>		<b>376.27±45.49</b>		<b>371.68±35.25</b>	
Cost/kg gain		93.68		95.87		97.91		98.61		92.63
Cost/kg edible meat		124.0		125.5		126.0		128.0		130.00

The feed efficiency ratios recorded in the present studies (4.17 to 4.42) are considered to be highly satisfactory. The prices of ingredients' of complex concentrate mixture which were used in present investigations have been incorporated in (Table 2). The prices of ingredients of complex concentrate mixtures which were used in present investigations have been summarized in

(Table 5). Prices were calculated per 100 kg feed. Cost (Rs.) per kg body weight gain. The costs of the concentrate mixture fed to T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub> and T<sub>5</sub> groups of pigs were 1934.00, 1882.50, 1930.00, 1917.00 and 1824.00 per quintal, respectively. The costs of feeding per animal per day were calculated to be to be Rs. 34.76, 33.91, 34.90, 35.03 and 32.93 for the groups T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub> and T<sub>5</sub> respectively and

the costs incurred on one kg gain in body weight were Rs. 93.68, 95.87, 97.91, 98.61 and 92.63 for the groups T<sub>1</sub> to T<sub>5</sub> respectively. The differences in costs incurred on one kg gain in body weight were found to be statistically non-significant. Similar trend was noted in cost of production by various workers when fed rations containing different agro-industrial by-products to many exotic pig (Campbell, 1987; Morgan. *et al.*, 1975; Nehring and Haenlein, 1973 and Ranjhan *et al.*, 1971).

Pig has a great potential to contribute to better economic return to the farmers. A balanced diet having proper ratio of energy and protein need to be prepared to make the pig farming economical. Average dry matter intake and weekly growth body weight gain were observed to be non-significant among groups (Table 4). The result indicates that different proportion of diet containing different ratio of energy and protein affects growth performance might be due to better utilization of diet having balanced proportion. The differences in costs incurred on one kg gain in body weight were also found to be statistically non-significant among the treatment groups.

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